# STTH15L06

## Turbo 2 ultrafast high voltage rectifier

**TO-220AC**  **TO-220FPAC**

K

A

NC

**D²PAK**

## Description

The STTH15L06, which is using ST Turbo 2 600 V technology, is specially suited for use in switching power supplies, and industrial applications, as rectification and discontinuous mode PFC boost diode.

**Table 1. Device summary**

| Symbol | Value |
|--------|-------|
| $I_{F(AV)}$ | Up to 20 A |
| $V_{RRM}$ | 600 V |
| $T_j$ | 175 °C |
| $V_F$ (typ) | 0.95 V |
| $t_{rr}$ (max) | 55 ns |

## Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching and conduction losses
- Low thermal resistance

# 1    Characteristics

**Table 2. Absolute ratings (limiting values)**

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{RRM}$ | Repetitive peak reverse voltage | | | 600 | V |
| $I_{F(RMS)}$ | Forward rms current | | | 30 | A |
| $I_{F(AV)}$ | Average forward current   $\delta = 0.5$ | TO-220AC / $D^2$PAK | $T_c$ = 140 °C <br> $T_c$ = 120 °C | 15 <br> 20 | A |
| | | TO-220FPAC | $T_c$ = 90 °C | 15 | |
| $I_{FSM}$ | Surge non repetitive forward current | $t_p$ = 10 ms sinusoidal | | 200 | A |
| $T_{stg}$ | Storage temperature range | | | -65 to + 175 | °C |
| $T_j$ | Maximum operating junction temperature | | | 175 | °C |

**Table 3. Thermal parameter**

| Symbol | Parameter | | Maximum | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case | TO-220AC / $D^2$PAK | 1.7 | °C/W |
| | | TO-220FPAC | 4.0 | |

**Table 4. Static electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $I_R$[1] | Reverse leakage current | $T_j$ = 25 °C | $V_R = V_{RRM}$ | | | 15 | μA |
| | | $T_j$ = 150 °C | | | 40 | 400 | |
| $V_F$[2] | Forward voltage drop | $T_j$ = 25 °C | $I_F$ = 15 A | | | 1.55 | V |
| | | $T_j$ = 150 °C | | | 0.95 | 1.2 | |

1.   Pulse test: $t_p$ = 5 ms, $\delta$ < 2 %

2.   Pulse test: $t_p$ = 380 μs, $\delta$ < 2 %

To evaluate the maximum conduction losses use the following equation:
$$P = 0.94 \times I_{F(AV)} + 0.017 \, I_F^2{}_{(RMS)}$$

**Table 5. Dynamic electrical characteristics**

| Symbol | Parameter | Test conditions | | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------------|--|------|------|------|------|
| $t_{rr}$ | Reverse recovery time | $T_j = 25\ °C$ | $I_F = 0.5\ A$, $I_{rr} = 0.25\ A$, $I_R = 1\ A$ | | | 55 | ns |
| | | | $I_F = 1\ A$, $dI_F/dt = 50\ A/\mu s$, $V_R = 30\ V$ | | 60 | 85 | |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\ °C$ | $I_F = 15\ A$, $dI_F/dt = 100\ A/\mu s$, $V_R = 400\ V$ | | 8.5 | 12 | A |
| $t_{fr}$ | Forward recovery time | $T_j = 25\ °C$ | $I_F = 15\ A$, $dI_F/dt = 100\ A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$ | | | 300 | ns |
| $V_{FP}$ | Forward recovery voltage | | | | 3 | | V |

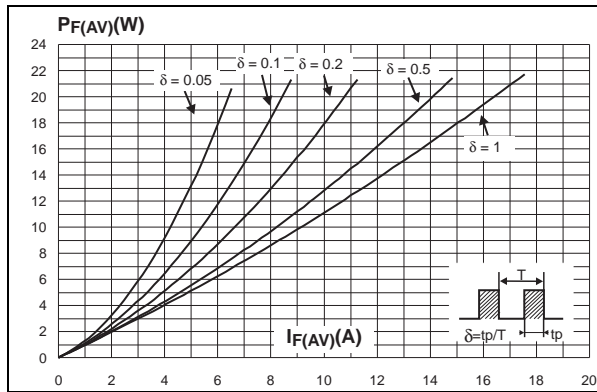**Figure 1. Conduction losses versus average current**



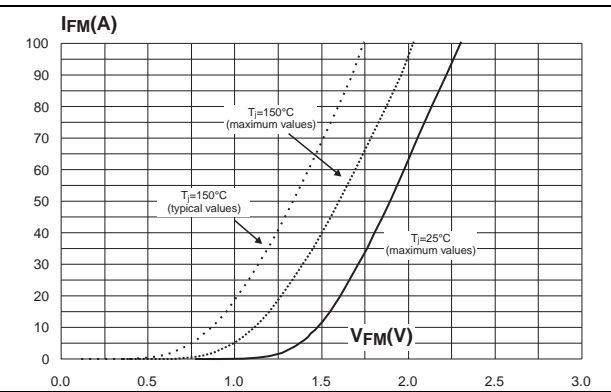**Figure 2. Forward voltage drop versus forward current**



**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, D²PAK)**
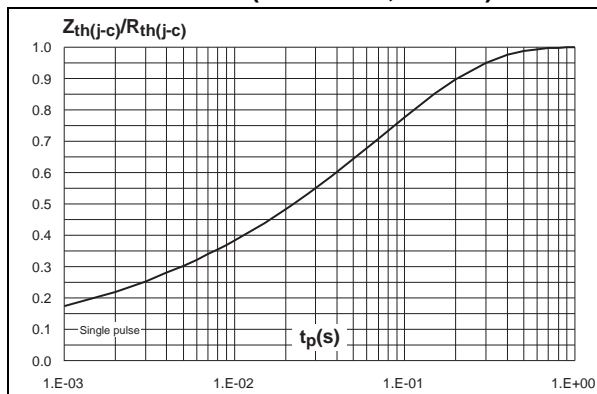


**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)**
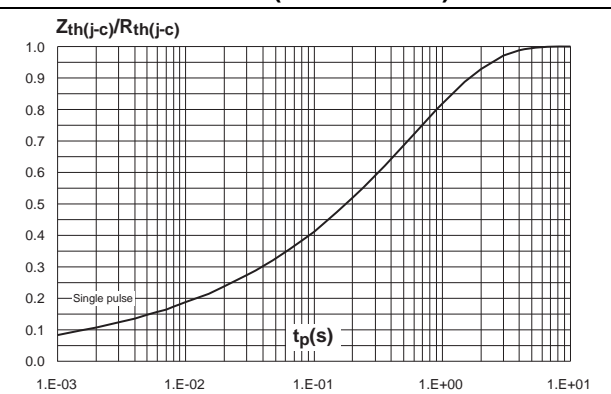
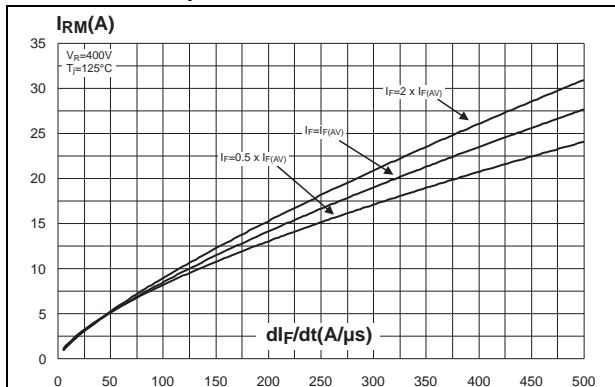**Figure 5. Peak reverse recovery current versus dI$_F$/dt (90 % confidence)**



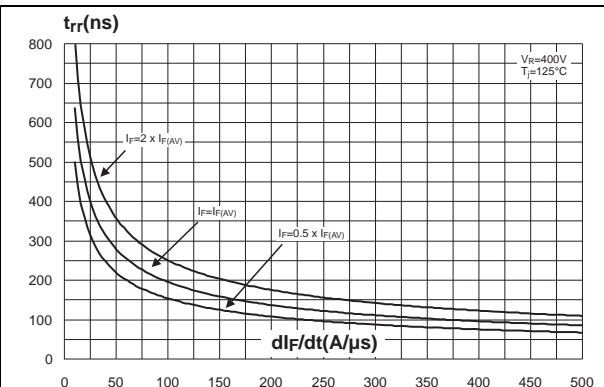**Figure 6. Reverse recovery time versus dI$_F$/dt (90 % confidence)**



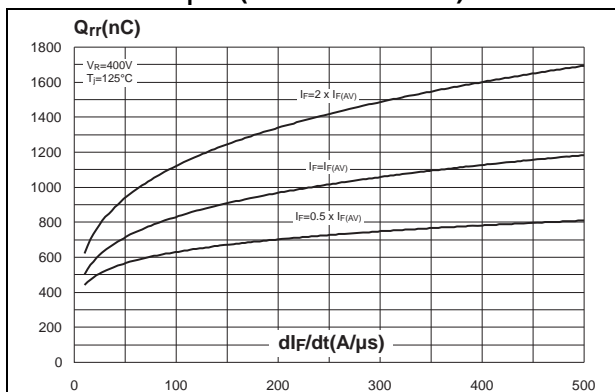**Figure 7. Reverse recovery charges versus dI$_F$/dt (90 % confidence)**



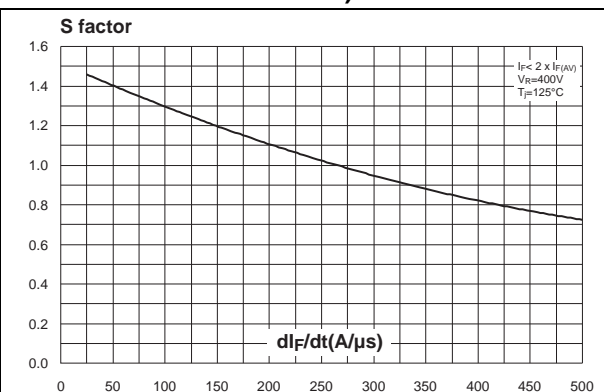**Figure 8. Softness factor versus dI$_F$/dt (typical values)**



**Figure 9. Relative variations of dynamic parameters versus junction temperature**



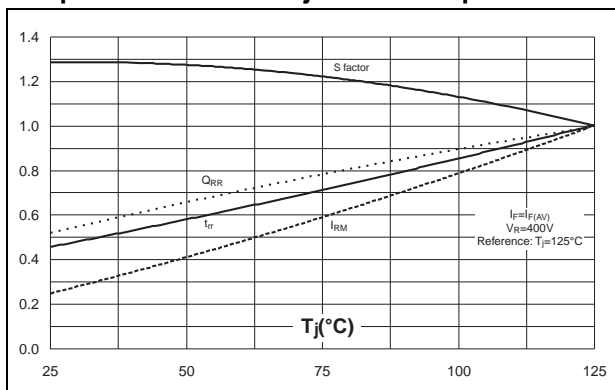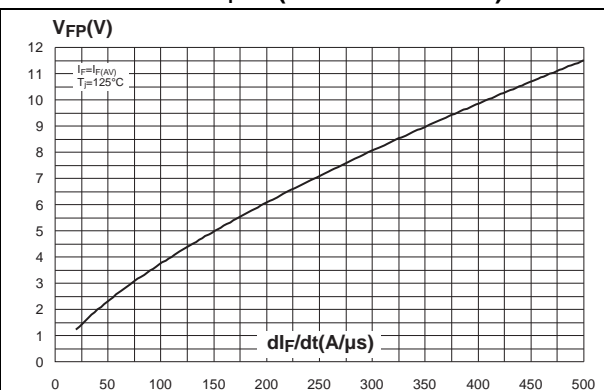**Figure 10. Transient peak forward voltage versus dI$_F$/dt (90 % confidence)**

**Figure 11. Forward recovery time versus dI$_F$/dt (90 % confidence)**



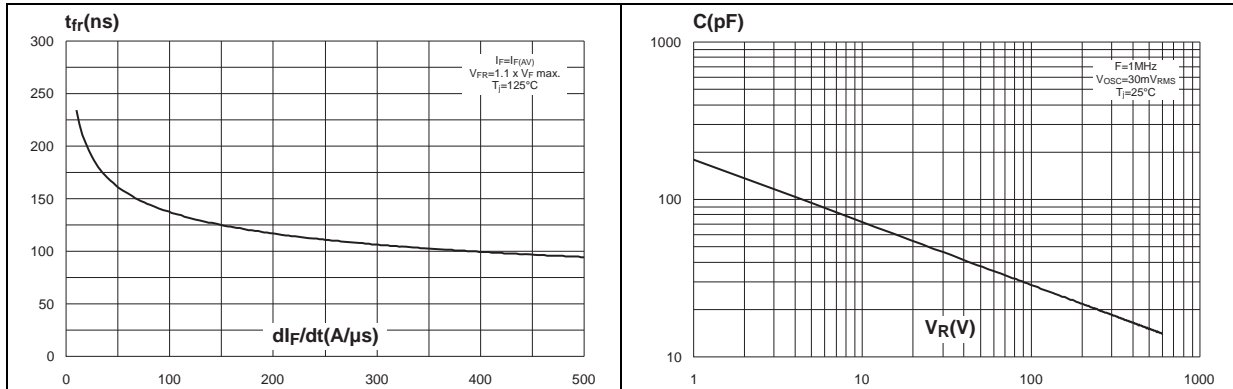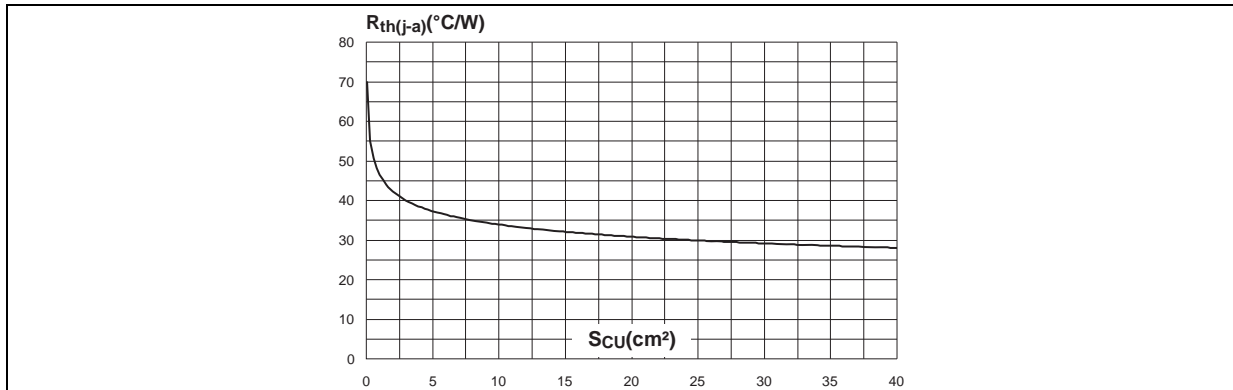**Figure 12. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 13. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4 copper thickness = 35 µm) (D$^2$PAK)**

# 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

**Table 6. TO-220AC dimensions**



| Ref. | Dimensions | | | |
| --- | --- | --- | --- | --- |
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| C | 1.23 | 1.32 | 0.048 | 0.051 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.49 | 0.70 | 0.019 | 0.027 |
| F | 0.61 | 0.88 | 0.024 | 0.034 |
| F1 | 1.14 | 1.70 | 0.044 | 0.066 |
| G | 4.95 | 5.15 | 0.194 | 0.202 |
| H2 | 10.00 | 10.40 | 0.393 | 0.409 |
| L2 | 16.40 typ. | | 0.645 typ. | |
| L4 | 13.00 | 14.00 | 0.511 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 15.25 | 15.75 | 0.600 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.259 |
| L9 | 3.50 | 3.93 | 0.137 | 0.154 |
| M | 2.6 typ. | | 0.102 typ. | |
| Dia. I | 3.75 | 3.85 | 0.147 | 0.151 |

### Table 7. TO-220FPAC dimensions



| Ref. | Dimensions | | | |
|------|------------|------|------|------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

## Table 8. D²PAK dimensions



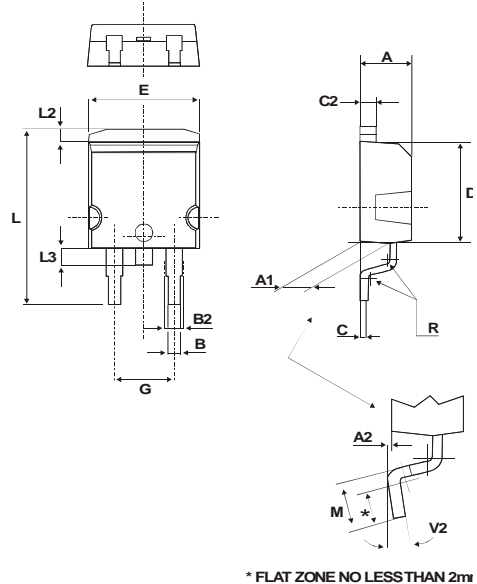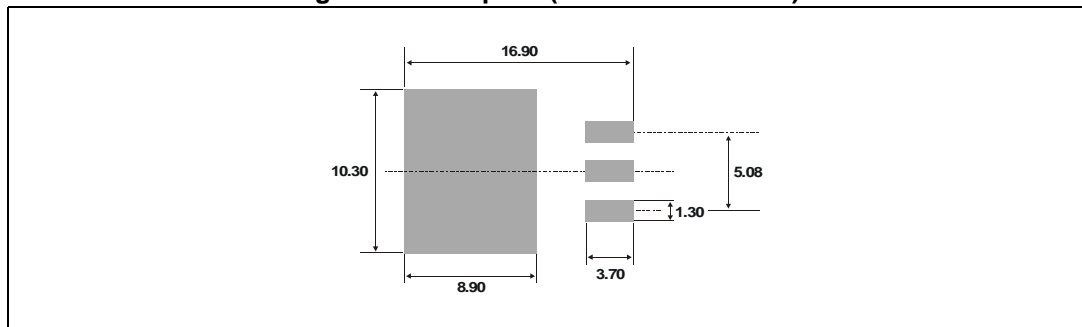| Ref. | Dimensions | | | |
| --- | --- | --- | --- | --- |
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.70 | 0.93 | 0.027 | 0.037 |
| B2 | 1.14 | 1.70 | 0.045 | 0.067 |
| C | 0.45 | 0.60 | 0.017 | 0.024 |
| C2 | 1.23 | 1.36 | 0.048 | 0.054 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| E | 10.00 | 10.40 | 0.393 | 0.409 |
| G | 4.88 | 5.28 | 0.192 | 0.208 |
| L | 15.00 | 15.85 | 0.590 | 0.624 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |
| L3 | 1.40 | 1.75 | 0.055 | 0.069 |
| M | 2.40 | 3.20 | 0.094 | 0.126 |
| R | 0.40 typ. | | 0.016 typ. | |
| V2 | 0° | 8° | 0° | 8° |

## Figure 14. Footprint (dimensions in mm)

# 3      Ordering information

**Table 9. Ordering information**

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|---|---|---|---|---|---|
| STTH15L06D | STTH15L06D | TO-220AC | 1.90 g | 50 | Tube |
| STTH15L06G | STTH15L06G | D$^2$PAK | 1.48 g | 50 | Tube |
| STTH15L06G-TR | STTH15L06G | D$^2$PAK | 1.48 g | 1000 | Tape and reel |
| STTH15L06FP | STTH15L06FP | TO-220FPAC | 1.70 g | 50 | Tube |

# 4      Revision history

**Table 10. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 07-Sep-2004 | 1 | First issue |
| 15-Jul-2011 | 2 | Updated $I_{FSM}$ from 130 A to 150 A. |
| 01-Apr-2014 | 3 | Updated $I_{FSM}$ from 150 A to 200 A. |

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.
Information in this document supersedes and replaces all information previously supplied.
The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2014 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

**www.st.com**

# X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for* Rectifiers *category:*

*Click to view products by* STMicroelectronics *manufacturer:*

Other Similar products are found below :

70HFR40  RL252-TP  150KR30A  1N5397  NTE5841  NTE6038  SCF5000  1N4002G  1N4005-TR  JANS1N6640US  481235F  RRE02VS6SGTR  067907F  MS306  70HF40  T85HFL60S02  US2JFL-TP  A1N5404G-G  CRS04(T5L,TEMQ)  ACGRA4007-HF  ACGRB207-HF  CLH03(TE16L,Q)  ACGRC307-HF  ACEFC304-HF  NTE6356  NTE6359  NTE6002  NTE6023  NTE6039  NTE6077  85HFR60  40HFR60  70HF120  85HFR80  D126A45C  SCF7500  D251N08B  SCHJ22.5K  SM100  SCPA2  SCH10000  SDHD5K  VS-12FL100S10  ACGRA4001-HF  D1821SH45T PR  D1251S45T  NTE5990  NTE6358  NTE6162  NTE5850